FEDERAL AVIATION ADMINISTRATION
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From: Dr. William K. Krebs, General Aviation Human Factors Program Manager
To: General Aviation TCRG

Subj: GENERAL AVIATION HUMAN FACTORS THIRD QUARTER '02 REPORT

Ref: General Aviation TCRG meeting, September 17th 2002

1) Per reference the upcoming TCRG meeting to be held in room 833 between 1000-1400, included is the third quarter report for each of the general aviation human factors projects. This quarterly report will help the TCRG evaluate each project's progress and ensure the requirements objectives are being met. In the future, quarterly reports and an annual report will be submitted to the TCRG.

2) Below is a summary of the projects that address the general aviation TCRG requirements. Please note, some of these projects may or may not address the sponsor's requirement due to the lack of or outdated information for this requirement. In FY03, this discrepancy will not exist.

3) The primary objective of the September 17th GA TCRG meeting will be to rank the general aviation human factors requirements from highest to lowest priority. From this list, the AAR-100's general aviation human factors program manager and the CAMI's flight deck human factors manager will allocate resources to address those requirements. Funds will be allocated to the highest ranked priorities with the lower ranked priorities not receiving resources. For each funded requirement, the AAR-100's general aviation human factors program manager will create an execution plan that will be submitted to the TCRG. The execution plan (between AAR-100 and GA TCRG) is a high level document that will specify major milestones and deliverables per year. Quarterly reports and the annual report should address and meet the execution plan milestones.

4) FY02 projects:

   a) Causal factors of accidents and incidents attributed to human error. As part of the FAA's effort to better understand the causal genesis of GA accidents CAMI researchers previously analyzed nine years (1990-98) of *fatal* GA accident data using the Human Factors Analysis and Classification System (HFACS). The

findings, though significant, reflected only about 20% of the total GA accidents that occurred during the time period of the study. Therefore, an analysis of the remaining *non-fatal* GA accidents was conducted to provide a more complete picture of the human factors associated with GA accidents.

A regional analysis was performed to determine whether pilots located in certain geographical areas committed more errors than other areas, e.g., AK pilots may commit more errors and violations than the continental United States. The researchers found no differences between FAA regions in the relative distribution of errors and violations committed by GA pilots involved in accidents. Even Alaska appears no different than the rest of the U.S. when the data are examined systematically. What this tells us is that whether your accident occurred in Alaska or Florida, California or New York, the relative distribution of unsafe acts (errors and violations) committed by aircrew was strikingly similar. Indeed, even those that espouse the "bush pilot" theory of flying in Alaska seem to be off base. While Alaska may witness more accidents, which in turn may be more a function of the fact that folks in Alaska fly aircraft like we take taxis in the continental U.S., the types of errors committed do not appear to vary. In sum, these findings seem to lend some credence to the old adage that "there are no new ways to crash aircraft, only new pilots."

All indications indicate that this project is on track to complete the milestones as planned.

b) CFIT/Terrain displays. In an analysis of over 12,000 general aviation accidents using the Human Factors Analysis and Classification System (HFACS), it was found that CFIT accidents were more often associated with skill-based errors, perceptual errors, and violations of the rules than were non-CFIT accidents. Results found a trend in that many CFIT accidents were the result of pilots continuing VFR flight into IMC (a violation of the rules using HFACS), followed in some cases by the failure to scan their instruments properly (a skill-based error using HFACS) and spatial disorientation (a perceptual error using HFACS). Another prevalent scenario involved pilots who continued VFR flight into IMC and then failed to possess the skills to fly safely.

Fourth quarter analysis will include:

i. compare flight into terrain versus flight into obstacles like telephone wires, towers, etc

Indications are that this activity is on track to be completed in FY02.

c) Comparison of the Effectiveness of a Personal Computer Aviation Training Device, a Flight Training Device and an Airplane in Conducting Instrument Proficiency Checks. The researcher is collecting data that will continue until April 2004. The purpose of this study will be to directly compare the performance of pilots receiving an IPC in a Frasca (IPC #1) and in an airplane

(IPC #2) and to compare the performance of pilots receiving an IPC in a PCATD and in an airplane. This comparison will investigate the effectiveness of the PCATD as a device in which to administer an IPC. In addition, performance of pilots receiving IPC #1 in an airplane and IPC #2 in an airplane with a second CFII will be compared. This comparison will permit the determination of the reliability of IPCs conducted in an airplane.

All indications indicate that this project is on track, however this project does not have an execution plan and it is unclear how the project's deliverable will meet the sponsor's objectives.

Recommend that this project be evaluated at the TCRG to determine who is the sponsor point of contact and how this project will meet the TCRG objectives.

d) Credit for Instrument Rating in a Flight Training Device or Personal Computer

i. Phase I: Survey UAA, Part 61, and Part 141 institutions. UAA survey has been completed. The Part 61 and 141 survey will be completed by December 2002.

Indications are that activity is on track to be completed as planned.

ii. Phase II: Capabilities of FTDs/PCATDs. A draft proposal to identify, list, and determine which FTDs (Phase 1) meet the criteria specified in the FAA's report entitled "Airplane Flight Training Devices – Qualification Performance Standard (QPS)" was received. This task will evaluate the standards for each FTD to determine whether the device qualifies at one of the established levels and the capabilities of each within Part 141 and selected Part 61 Aviation Training Schools. CAMI scientists will conduct an evaluation of the proposal. It is anticipated that the contract will be awarded in FY02 Q4 and the work completed early in FY03.

Indications are that activity is on track to be completed as planned.

iii. Phase III: Transfer of Training Effectiveness of a Flight Training Device (FTD). A proposal was received to evaluate the transfer of training effectiveness of a flight-training device (FTD). This effort will evaluate the training effectiveness by comparing performance of student pilots trained on instrument tasks in an FTD and later trained to criterion in an airplane to those trained to criterion in an airplane only. By using the transfer effective ratio (TER) developed by Roscoe (1971), which calculates the trials/time saved in the airplane as a function of the prior trials/time in the ground trainer. These data will improve our understanding of the utility of FTDs in flight training and serve to update current FAA guidance regarding the use of FTDs in instrument training. CAMI scientists will conduct an evaluation of the proposal. It is

anticipated that the contract will be awarded in FY02 Q4. In addition, the research institution was granted a waiver by the FAA to conduct the study.

Indications are that this activity is on track.

e) Developing And Validating Criteria for Constraining False & Nuisance Alerts For Cockpit Display Of Traffic Information Avionics. The grant proposal has been reviewed and submitted to the WJHTC grant's office. The researcher should begin the literature review by October 2002.

Indications are that this activity is on track.

f) Establish certification requirements for the use of helmet-mounted display technology in General Aviation. A lack of response from the LA ACO regarding potential scheduling and a lack of feedback from the sponsor on any necessary changes to the document delayed the final validation tests beyond the originally planned dates. The sessions are being rescheduled for early August and will be held at the Wichita ACO.

Indications are that there are minor risks to the activity being completed as planned. The requirement will be completed in September 2002.

g) General Aviation Training. Data collection for CAMI's participation in a study of a combined HITS and multifunction display has been completed. Data analysis is ongoing. Data collection at ERAU and The Ohio State University has been completed. A final report of The Ohio State University data has been delivered.
   i. A final report from ERAU and OSU was delivered in July.

Completed: researcher's objectives have been met. The requirement will not receive any further funding.

h) JSAT ADM Panel. The panel convened and presented results to the ADM JSAT.

Completed: Task/activity's objectives have been met. The requirement will not receive any further funding.

i) Loss of Primary Flight Instruments during IMC. The final technical report on the airborne portion of the study (AOPA Air Safety Foundation the performing organization) was submitted to the review process. The Small Airplane Directorate (Kansas City) was briefed on the airborne-portion outcomes on the 26th of June. A final briefing for the sponsors was briefed on July 12th at headquarters.

Completed: Task/activity's objectives have been met. The requirement will not receive any further funding.

j) Low Visibility and Visual Detection. On July 23rd, Anne Graham submitted the requirement to the database. The purpose of this requirement is to develop research and educational materials that will help reduce accidents caused by 4 related problems: 1) continued flight into reduced visibility, 2) failure to detect targets, 3) failure to utilize resources, 4) need for improved education and training for problems 1-3. The general aviation human factors program manager requested a grant proposal with the intent of partially funding the project this fiscal year. The researcher intends to submit the proposal by August 21st.

Indications are that this activity is on track

k) Pilot field-of-vision capabilities/limitations. The proposed helmet-mounted display configuration was not compatible with the AGARS and the BGARS devices. The contractor proposed a different solution, however a delivery date has not been identified.

Indications are that there are major risks to the activity being completed as planned.

This requirement will need to be revaluated at the TCRG meeting. The requirement description is outdated and does not contain objectives, metrics, and deliverables, and schedule milestones. In addition, there is no execution plan for this requirement.

l) Priorities, organization, and sources of information accessed by pilots in various phases of flight. Contract was awarded late. Researcher has been working on project and in August plans to collect data using the TRACS simulator at Honeywell BCAS in Glendale, AZ and the Jeppesen EFB software. The project should be completed one month late – October 2002.

Indications are that there are minor risks to the activity being completed as planned. The requirement will be completed in October 2002.

m) Reduction of Weather-Related and Maneuvering Flight GA Accidents. Researcher completed data collection and is writing a final report.

Completed: Task/activity's objectives have been met.

The researcher has entered the third and final year of the grant. Recommend to the TCRG to re-evaluate requirement to determine whether further research is needed.